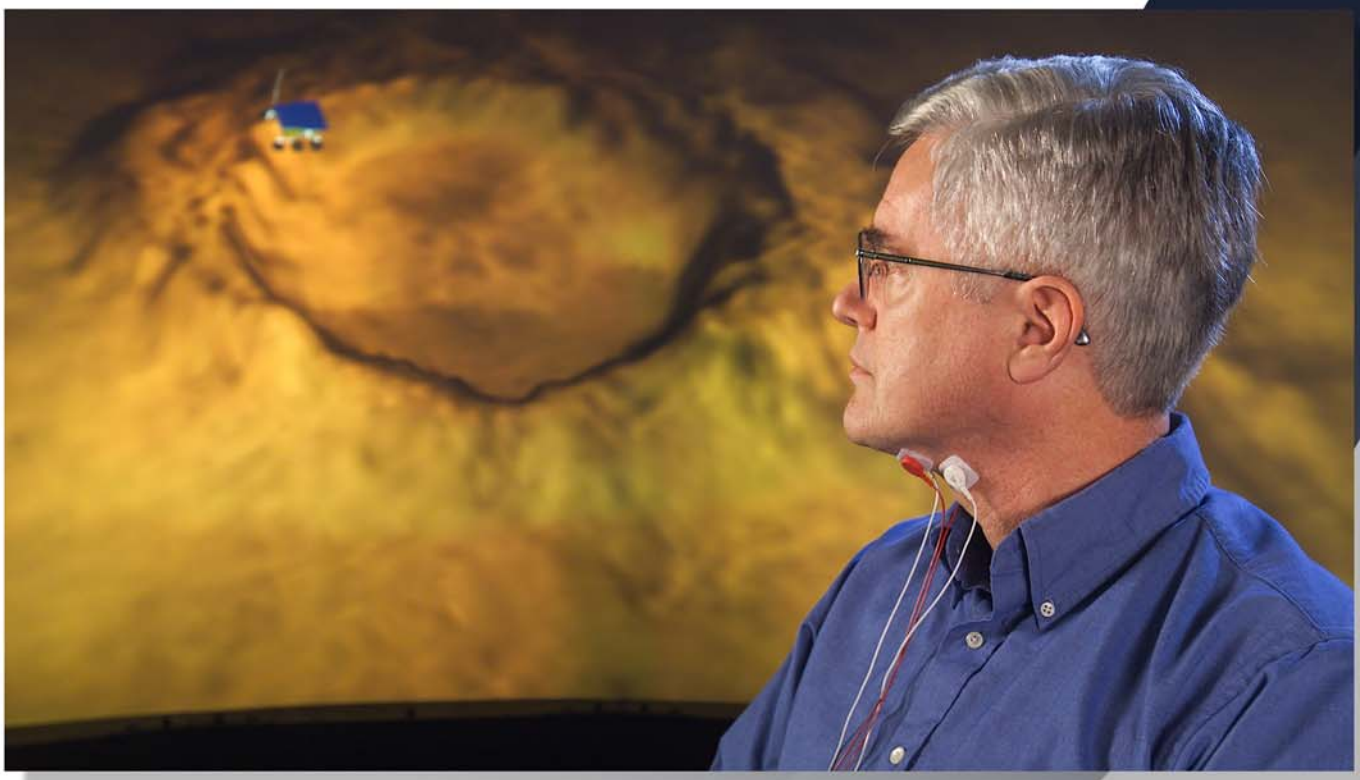
Subvocal Speech

NASA Ames Research Center Computational Sciences Division



Practical constraints of long-duration space travel could force astronauts on Mars to live and work in restricted environments. A technology being developed at Ames Research Center that captures a person's intent from nerve signals, might one day replace instrument panels as an interface to machines that will support human exploration on Mars.

The technology works because when a person reads or thinks of a phrase, the brain sends speech signals to the tongue and vocal cords, even though the person is not speaking or moving his lips or face. For example, instead of a person commanding a machine through a joystick or keyboard, the software extracts from the electrical signals what is necessary to reproduce the intentions of the person into the machines.

In experiments, the Ames scientists use small, button-sized sensors stuck under the chin and on either side of the Adam's apple, to capture the nerve signals. The technology sends the signals to a processor and then to a computer program that translates them into words.

In a recent experiment, the system learned to recognize words such as "stop," "go," "left," "right," "alpha" and "omega," and the numerals zero through nine. One demonstration controls a graphic model of the Mars rover. A second demonstration uses a simple set of commands in a Web browsing demonstration. Scientists are also testing "non-contact" sensors that can read muscle signals even through a layer of clothing.

Eventually, a 'subvocal speech' system could be used in spacesuits, to control rovers and other vehicles, in noisy places like airport towers and space habitats or even in traditional voice-recognition programs to increase accuracy.

Other subvocal speech applications might include medical enhancements for injured or disabled people, and private communication in noisy environments. For example, astronauts, air traffic controllers, and underwater divers or accident victims who are unable to speak out loud due to their physical condition or location might use this technology.

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